USFS POWELL RANGER STATION (PWS 2250078)
SOURCE WATER ASSESSMENT FINAL REPORT

February 25, 2003

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated source water assessment area and sensitivity factors associated with the spring and aquifer characteristics.

This report, *Source Water Assessment for USFS Powell Ranger Station, Idaho County, Idaho,* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The USFS Powell Ranger Station drinking water system consists of one active spring. The system was originally developed in the early 1960's and currently serves approximately 100 people through 25 connections.

Final susceptibility scores are derived from system construction scores and potential contaminant/land use scores. Therefore, a low rating in one categories coupled with a higher rating in the other category results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a spring can get is moderate. Potential Contaminants/Land Uses are divided into four categories, inorganic contaminants (IOCs, i.e. nitrates, arsenic), volatile organic contaminants (VOCs, i.e. petroleum products), synthetic organic contaminants (SOCs, i.e. pesticides), and microbial contaminants (i.e. bacteria). As different springs can be subject to various contamination settings, separate scores are given for each type of contaminant.

In terms of total susceptibility, the Spring rated low for IOCs, VOCs, SOCs, and microbial bacteria. System construction rated moderate for the spring, and land use rated low for IOCs, VOCs, SOCs, and microbial contaminants.

No VOCs or SOCs have ever been detected in the spring. The IOCs detected in the water system were barium, calcium, chloride, fluoride, iron, lead, manganese, nitrate, sulfate and zinc. Concentrations of each compound have been significantly below maximum contaminant levels (MCLs). A repeat detection of total coliform was detected in the distribution system in December 1999. This water system has had a history of total coliform issues, however water samples taken at the springbox indicate the contamination is occurring from within the distribution system.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well or spring sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For the USFS Powell Ranger Station, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Actions should be taken to keep all potential contaminants more than 100 feet from the spring. Any contaminant spills within the delineation should be carefully monitored and dealt with. As much of the designated protection areas are outside the direct jurisdiction of the USFS Powell Ranger Station, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection. In addition, any new wells should maintain sanitary standards regarding wellhead protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. For assistance in developing protection strategies please contact the Lewiston Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR USFS POWELL RANGER STATION, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the rankings of this assessment mean.** Maps showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop the assessment is also included.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the springs and wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The local community, based on its own needs and limitations, should determine the decision as to the amount and types of information necessary to develop a drinking water protection program. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The USFS Powell Ranger Station drinking water system consists of one active spring. The system was originally developed in the early 1960's and currently serves approximately 100 people through 25 connections.

No VOCs or SOCs have ever been detected in the spring. The IOCs detected in the water system were barium, calcium, chloride, fluoride, iron, lead, manganese, nitrate, sulfate and zinc. Concentrations of each compound have been significantly below maximum contaminant levels (MCLs). A repeat detection of total coliform was detected in the distribution system in December 1999.

Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a spring or well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a source) for water in the aquifer. DEQ contracted with the University of Idaho to perform the delineations using a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the aquifer of the Clearwater Uplands in the vicinity of the USFS Powell Ranger Station spring. The computer model used site specific data, assimilated by the University of Idaho from a variety of sources including operator input, local area well logs, and hydrogeologic reports (detailed below).

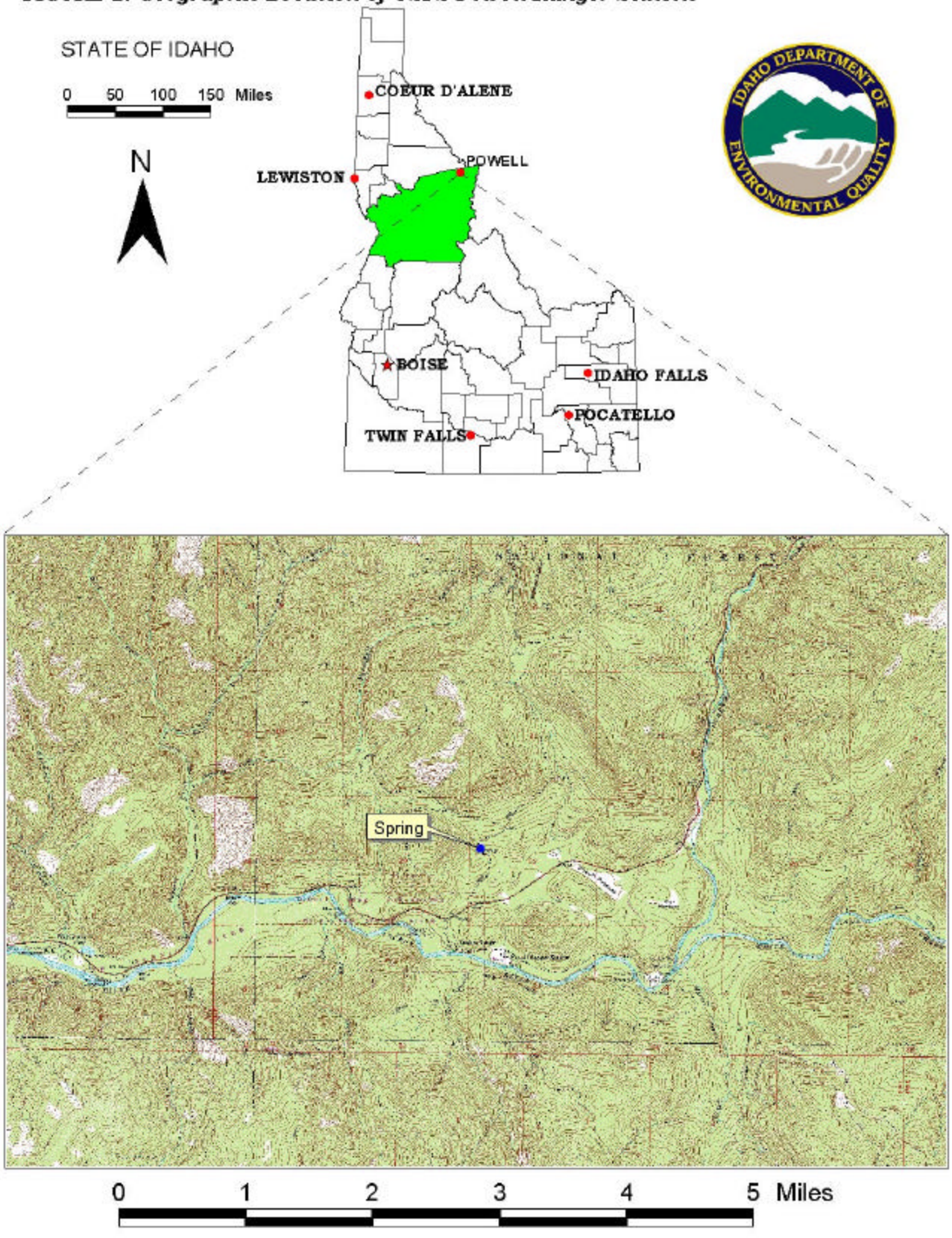
Hydrogeologic Setting

The conceptual hydrogeologic model for the USFS Powell source spring is based on published geologic maps. The spring is believed to derive water from course-grained garnet-mica schist, metasediments of the Pre-Cambrian Belt Supergroup. Bedrock geology is based on the geologic map of the Hamilton quadrangle at a scale of 1:250,000 (Rember and Bennett, 1979). The Lochsa River is approximately ¾ of a mile south of the spring.

Figure 1 and Figure 2 shows the location of the source spring. The ground elevation is approximately 3780 feet above mean sea level (MSL) at the spring location. Maximum discharge from the spring and its recession characteristics are unknown; however, the usage is approximately 200 gpm. Little information is known about the hydrogeology of the area.

There are several methods of mapping protection zone delineations for springs as discussed in the EPA report written by Jensen et al., 1997. These include surface mapping of hydrogeologic features, which is based upon geologic mapping, fracture-trace analysis, and topographic and geographic analyses, catchment area estimation, tracer studies, geochemical characterization, isotope studies, potentiometric surface mapping, geophysical techniques, and methods used to support hydrogeologic mapping. Due to limited data available, the spring delineations are determined by examining the following:

FIGURE 1. Geographic Location of USFS Powell Ranger Station



4. Identification of faults or other structural features (also as possible hydrologic boundaries)
5. Identification of potential recharge areas
6. Catchment area (Todd, 1980)

The capture zone delineated herein is based on limited data and must be taken as best estimates. If more data become available in the future these delineations should be adjusted based on additional analyses incorporating the new data.

The delineated source water assessment area for the spring can best be described as the approximate drainage basin north and northeast of the spring, extending westward to include parts of Parachute Creek's drainage (Figure 2). The actual data used by the University of Idaho in determining the source water assessment delineation areas is available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of groundwater contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

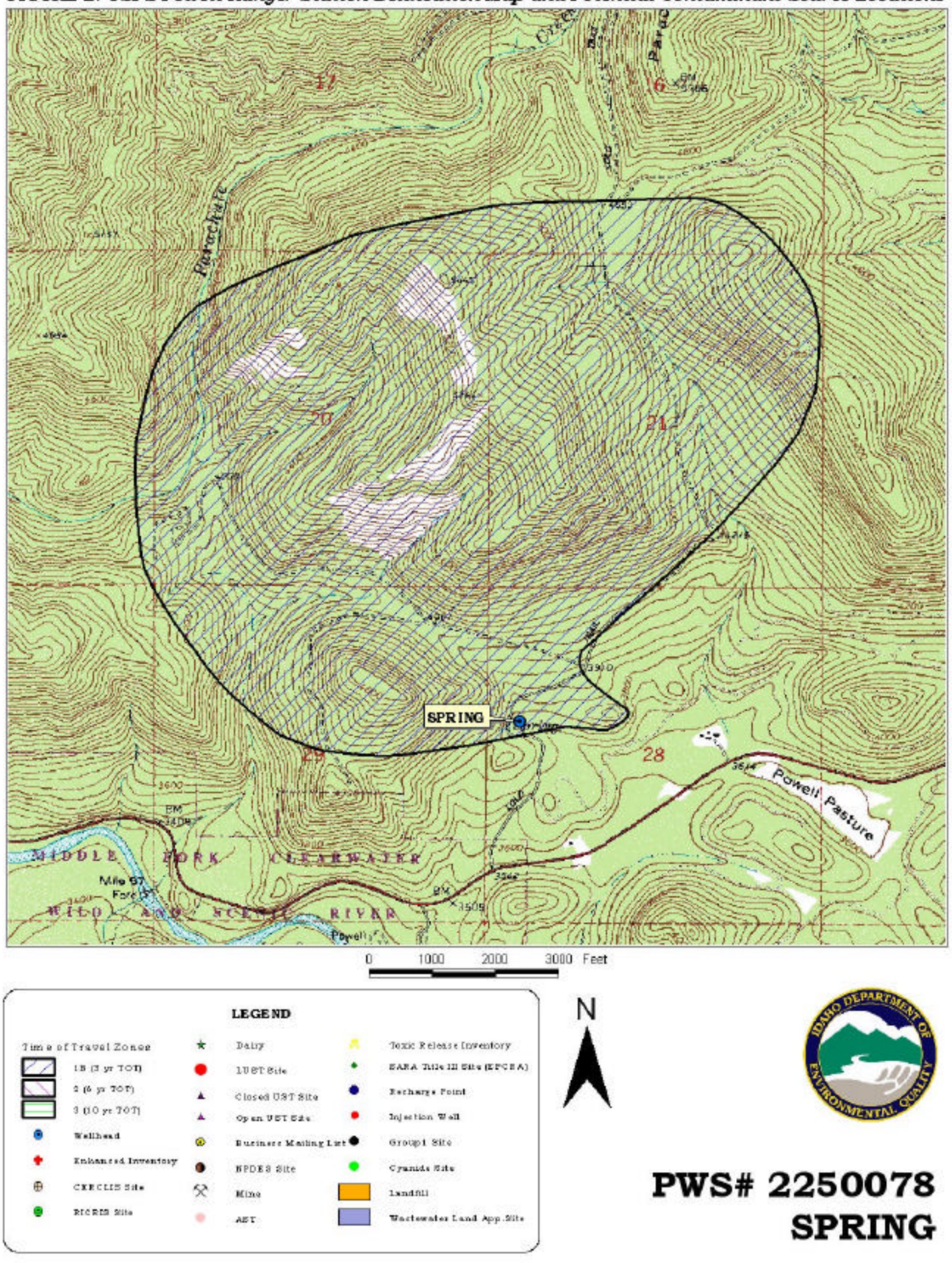
Land use within the immediate area and the surrounding area of the USFS Powell Ranger Station source is almost exclusively undeveloped range land or woodland.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply source.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in March and April 2002. The first phase involved identifying and documenting potential contaminant sources within the USFS Powell Ranger Station source water assessment areas (Figure 2, Table 1) through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ.

FIGURE 2. USFS Powell Ranger Station Delineation Map and Potential Contaminant Source Locations



The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the area. No additional potential contaminant sources were identified by the system's operator.

The delineated source water assessment area of the USFS Powell Ranger Station spring contains only one potential contaminant source, Parachute Creek. This source can contribute leachable contaminants to the aquifer in the event of an accidental spill, release, or flood.

Table 1. USFS Powell Ranger Station, Spring, Potential Contaminant/Land Use Inventory.

Site	Description of Source[1]	TOT[2] Zone	Source of Information	Potential Contaminants[3]
	Parachute Creek	0-3 YR	GIS Map	IOC, VOC, SOC, Microbial

[2] TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Section 3. Susceptibility Analyses

Each well or spring's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well or spring is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Appendix A contains the susceptibility analysis worksheets for the system. The following summaries describe the rationale for the susceptibility ranking.

Spring Construction

Spring construction scores are determined by evaluating whether the spring has been constructed according to Idaho Code (IDAPA 58.01.08.04) and if the spring's water is exposed to any potential contaminants from the time it exits the bedrock to when it enters the distribution system. If the spring's intake structure, infiltration gallery, and housing are located and constructed in such a manner as to be permanent and protect it from all potential contaminants, is contained within a fenced area of at least 100 feet in diameter, and is protected from all surface water by diversions, berms, etc., then Idaho Code is being met and the score will be lower. If the spring's water comes in contact with the open atmosphere before it enters the distribution system, it receives a higher score. Likewise, if the spring's water is piped directly from the bedrock to the distribution system or is collected in a protected spring box without any contact to potential surface-related contaminants, the score is lower.

The Spring rated moderate for construction. It was constructed in 1963 and produces enough water to maintain the system's 17,000-gallon storage reservoir. The spring construction was considered "good" by James Grubb, P.E., during the June 2000 Sanitary Survey evaluation. The construction score was increased by a point because it is unknown if the area within 100 feet of the spring is in direct legal control of the water system and fenced. In addition, during the ground water under direct influence (GWUDI) field survey (1995), it was noted that the spring needed to be protected from the encroaching hillside.

Potential Contaminant Source and Land Use

The Spring rated low for IOCs (i.e. nitrates, arsenic), VOCs (i.e. petroleum products), SOCs (i.e. pesticides), and microbial contaminants. The low number of potential contaminant sources within the delineation contributed to the favorable land use scores.

Final Susceptibility Ranking

An IOC detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the spring will automatically give a high susceptibility rating to a spring despite the land use of the area because a pathway for contamination already exists. Land Use scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0 to 3-year time of travel zone (Zone 1B) and agricultural land contribute greatly to the overall ranking.

Table 2. Summary of USFS Powell Ranger Station Susceptibility Evaluation

Source	Susceptibility Scores[1]								
	Contaminant Inventory				System Construction	Final Susceptibility Ranking			
	IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Spring	L	L	L	L	M	L	L	L	L

[1]H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

The USFS Powell Ranger Station drinking water system consists of one active spring. The system was originally developed in the early 1960's and currently serves approximately 100 people through 25 connections.

In terms of total susceptibility, the spring rated low for IOCs, VOCs, SOCs, and microbial bacteria. System construction rated moderate for the spring, and land use rated low for IOCs, VOCs, SOCs, and microbial contaminants.

Section 4. Options for Drinking Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For the USFS Powell Ranger Station, drinking water protection activities should first focus on correcting any deficiencies outlined in the sanitary survey. No chemicals should be stored or applied within A100 feet radius of the spring. As much of the designated protection areas are outside the direct jurisdiction of the USFS Powell Ranger Station, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of drinking water protection. In addition, any new wells should maintain sanitary standards regarding wellhead protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Lewiston Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Lewiston Regional DEQ Office (208) 799-4370

State DEQ Office (208) 373-0502

Website: http://www.deq.state.id.us

Water suppliers serving fewer than 10,000 persons may contact Melinda Harper, mlharper@idahoruralwater.com, Idaho Rural Water Association, at 208-343-7001 for assistance with drinking water protection (formerly wellhead protection) strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund≅ is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5 mg/L.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

References Cited

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. "Recommended Standards for Water Works."

Idaho Department of Agriculture, 1998. Unpublished Data.

Idaho Department of Environmental Quality, 1997. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

Idaho Department of Environmental Quality. 1995. Ground Water Under Direct Influence Field Survey.

IDAPA 58.01.08, Idaho Rules for Public Drinking Water Systems, Section 004.

Jensen, M.E., Lowe, M., and Wireman, M.; 1997. Investigation of Hydrogeologic Mapping to Delineate Protection Zones Around Springs, Report of Two Case Studies, EPA/600/R-97-023, 60p.

Rember, W.C., and Bennett, E.H.; 1979. Geologic Map of the Hamilton Quadrangle, Idaho, Idaho Bureau of Mines and Geology, Moscow, ID.

Todd, D.K.; 1980. Groundwater Hydrology, John Wiley and Sons, New York, 535p.

United States Forest Service, 2000. Water System Sanitary Survey Report; Powell Ranger Station.

Appendix A

USFS Powell Ranger Station

Susceptibility Analysis Worksheet

Formulas used to determine Susceptibility Analysis Final Scores

Formula for Spring Sources

1. VOC/SOC/IOC/ Final Score = (Potential Contaminant/Land Use X 0.818) + System Construction

2. Microbial Final Score = (Potential Contaminant/Land Use X 1.125) + System Construction

Final Susceptibility Scoring:

0 - 7 Low Susceptibility
8 - 15 Moderate Susceptibility
≥ 16 High Susceptibility

Potential Contaminant Inventory Form

Source ID Lookup: 22500781

Source ID: 22500781
PWS Number: 2250078
PWS Name: USFS POWELL RANGER STATION
Source Name: SPRING

Soil Drainage Class Correct as of

PCI Completed By: Sean Coyle

Soil Drainage Classes

	Area in Acres			Percentages	
	Mod to Well	Poor to Mod	Total Area	Mod. to Well	Poor to Mod.
3 year TOT	1113.9	508.4	1622.34	68.66%	31.34%
6 year TOT	0	0	0		
10 year TOT	0	0	0		
	1113.9	508.4	1622.34	68.66%	31.34%

Land Use

	Urban	Irrigated Ag.	Dryland Ag.	Undetermined Ag.	CRP or Fallow	Disturbed
3 year TOT	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
6 year TOT						
10 year TOT						
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Nitrate Priority Area: N
Inorganics Priority Area: N
Inorganic Type: Not applicable
Organics Priority Area: N
Organic Type: Not applicable

County Level Nitrogen Fertilizer Use: Medium
County Level Herbicide Use: Medium
Total County Level Ag-Chemical Use: Medium
Known Volatile Organic Compound Plume: N
Wellhead in 100 yr Flood Plain: N

Potential Contaminant Sources